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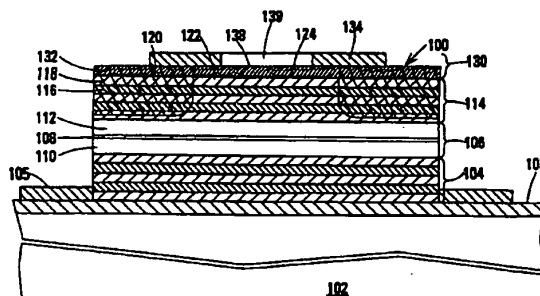
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(54) **Low voltage-drop electrical contact for gallium (aluminium, indium) nitride**

(57) An electrical contact (130, 230, 330, 430) that comprises a layer (118) of a p-type gallium nitride material, a metal layer (134), and an intermediate layer (132, 232, 332, 432) of a material different from the gallium nitride material and the metal layer. The intermediate layer is sandwiched between the layer of p-type gallium nitride material and the metal layer. The material of the intermediate layer (132) may be a Group III-V semiconductor that has high band-gap energy, lower than that of the p-type gallium nitride material. The intermediate layer (232) may alternatively include layers (e.g., 240, 242, 244) of different Group III-V semiconductors. The layers of the different Group III-V semiconductors are arranged in order of their band-gap energies, with the Group III-V semiconductor having the highest band-gap energy next to the layer of the p-type gallium nitride material, and the Group III-V semiconductor having the lowest band-gap energy next to the metal layer. As a further alternative, the material of the intermediate layer (332) may be a metal nitride. As a yet further alternative, the material of the intermediate layer (432) may be a gallium nitride material in which a percentage of the nitrogen atoms are replaced by a mole fraction  $x$  of atoms of at least one other Group V element. The value of  $x$  is close to zero next to the layer (118) of p-type gallium nitride material and close to one next to the metal layer (134).

zero next to the metal layer (134).



**FIG.1**



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## EUROPEAN SEARCH REPORT

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
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A	* the whole document *	4,5, 13-16	
X	PATENT ABSTRACTS OF JAPAN vol. 096, no. 002, 29 February 1996 & JP 07 283167 A (SUMITOMO CHEM CO LTD), 27 October 1995	1-3,11, 12	
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A	* abstract *		
Y	"HIGHER VISIBILITY FOR LEDS MORE LIGHT-SOME OF IT BLEU-FROM LESS POWER UNVEILS BRIGHT VISTAS OF NEW APPLICATIONS FOR THE LATEST LIGHT-EMITTING DIODES" IEEE SPECTRUM, vol. 31, no. 7, July 1994, pages 30-34, 39, XP000460429	9,10,15, 16	TECHNICAL FIELDS SEARCHED (Int.Cl.6) H01L
Y	* page 39; figure 8 *		
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Y	* claims 1-6; figure 1 *		
A	FR 2 696 278 A (THOMSON CSF) 1 April 1994	9,10	
A	* figures 1A,1B,3 *		
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 13 November 1998	Examiner Juhl, A
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